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EXAMINER	
ROBERTSON, DAVID	
ART UNIT	**PAPER NUMBER**
2121	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/516,337	SAKIYA ET AL.	
	Examiner	Art Unit	
	Dave Robertson	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 November 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/4/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This is a Non-final First Office Action on the Merits. Claims 1-41 as amended by Preliminary Amendment filed on 11/30/2004 are examined herein.

Information Disclosure Statement

2. The information disclosure statement (IDS) filed 1/4/2005 is in compliance with the provisions of 37 CFR 1.97. However, foreign references listed and submitted therewith have been considered by the examiner only to the extent of the English language material provided as indicated on the PTO 1449 accompanying this office action (see "Abstract Only" in the Examiner Initials area of the foreign references).

Drawings

3. Figures 1, 2, 3, 25 and 26 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). The specification pages 1-3 refers to these drawings as depicting prior art conventional systems and methods. Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The abstract of the disclosure is objected to because it exceeds 150 words. Correction is required. See MPEP § 608.01(b).

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "METHOD AND SYSTEM FOR TEACHING REFERENCE POSITION OF SEMICONDUCTOR WAFER IN AUTOMATED WAFER HANDLING MANUFACTURING EQUIPMENT".

6. The specification of the disclosure is objected to because the specification is replete with terms and phrases which are not clear or grammatically incorrect. Examples of some unclear, inexact or verbose terms used in the specification are: On page 4: "…a method requiring hard trouble." and "…a continuation of tensible [sic?] work…" and "…Phytagorean [sic] theorem." Correction is requested.

7. The specification is further objected to for referring to specific claim numbers throughout the Detailed Description (see pages 7-21). Because claims during prosecution may be cancelled or substantially amended, and at allowance renumbered, claims in the specification will not necessarily refer to the same subject matter as upon originally filing.

8. The guidelines of 37 CFR 1.77(b) illustrate the preferred layout for the specification of a utility application and are suggested for the applicant's use as applicable to the subject matter. In particular, the section of the instant specification "Prior Art" is typically presented in a "Background of the Invention" and the "Brief

Description of the Drawings" should appear prior to the "Detailed Description" and following a "Summary of the Invention". As provided in 37 CFR 1.77(b), the specification of this utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading.

TITLE OF THE INVENTION

BACKGROUND OF THE INVENTION

Technical Field of the Invention

Description of Related Art

SUMMARY OF THE INVENTION

BRIEF DESCRIPTION OF THE DRAWING(S)

DETAILED DESCRIPTION

Claim Objections

9. Claims 4 and 10 are objected to because of the following informalities: Claims 4 and 10 recite **a step of calculating the center position of a circle when <u>those intersections</u> are situated**. While presumably clear that the phrase "those intersections" refers to the "two pairs of intersections" in the limitation above, clarity would be improved by referring to "those intersections" as **<u>said two pair of</u> intersections**.

10. Examiner also notes that while the use of "fore-mentioned" in the claims to refer to previously recited elements, customarily the word used is "said" as in "said detection means" and "said two loci…" etc.

11. Amendment of the Drawings, Specification (including Abstract), and Claims per the above objections are requested in response to this office action.

Claim Rejections - 35 USC § 112

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 7-12, 15-17, 21, 25, and 27-41 (all "device" claims) are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 7, 9, 10, 15, 27, and 31 each recite: *A device … comprising* … one or more ***means of*** *detecting…*, *calculating…*, or *determining…* However, it is not precisely clear what *structure* is being employed for the *calculating* and *determining* as no computer or processor for the performing the disclosed algorithms (see e.g. "Means for Solving Problems") are themselves disclosed. Rather, the specification provides detailed descriptions of formulas and steps for the *calculating* and *determining*, but provides no specific structure for performing these mathematical operations. Therefore, the *device* claims, reciting "means of" followed by a function that the undisclosed

structural means performs, are indefinite because it cannot be determined how the *structure* of the device is modified by these limitations.

Examiner notes that use of the phrase "means of" in the device claims does *not* invoke a presumption that 35 U.S.C. 112, 6th paragraph, applies. See MPEP § 2181. The presumption of 112, 6th paragraph, only applies with the explicit use of "means for" when introducing functional limitations, which do not modify structure of the claimed means. Notwithstanding the above, structure for such "means" under 112, 6th paragraph, must still be disclosed, and therefore claims to any *device* comprising "means for…" must be supported by sufficiently disclosed *structure* to support the operation of such claims.

Claims 8, 11, 12, 16, 17, 28-30, and 32-41 depend from one of claims 7, 9, 15, 27, and 31 and are similarly deficient for reasons given above.

Amendment or clarification is requested.

Claims 21, 25, 30, and 34 recite: ***…at least 3 points detected on the peripheral rim of the fore-mentioned disc-like object are 4 points or more…*** However, it is unclear how "3 points" can be "4 points or more". For the purposes of examination, the limitation will be interpreted as: *at least 3 points detected on the peripheral rim of the fore-mentioned disc-like object are selected from 4 points or more…*

Amendment or clarification is requested.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

15. Claims 13-19, 21-23, 25-28, 30-32, 34, 35, 37, 40, and 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Sundar et al. (US Pat. No. 6,198,976).

> **Examiner note:** Citations to particular drawing figures, pages, and paragraphs of the prior art reference(s) relied upon in this office action, and any comments directed thereto, are provided where considered necessary to indicate relevant teachings in the prior art (see MPEP 706.02(j), 707); however, other portions of the prior art not specifically cited may also apply.
>
> In formulating a response to rejections herein, Applicant is advised to consider the references *in their entirety* as well as the context of the teachings within the prior art and within what the prior art *as a whole* would have suggested to one of ordinary skill in the art at the time of invention.

Claim 13

Sundar et al. teaches **a method for automatically positioning a disc-like object with an unknown radius having one concave portion or one convex portion at one portion of peripheral rim in the reference co-ordinate system including the position of a handling device of the disc-like object** (see Abstract)**, comprising**

a step of determining the center position of the fore-mentioned disc-like object having a concave portion or a convex portion in the fore-mentioned

reference co-ordinate system (Figure 7; column 10, lines 1-38: finding the center of a "notched" wafer substrate) **and**

a step of calculating a transition quantity from the center position preliminarily taught to the fore-mentioned center position determined in the fore-mentioned reference co-ordinate system (Figure 7; column 9, lines 65-68: calculating a substrate center offset…, a "transition quantity" from the center position)**,**

wherein the step of determining the center position of the fore-mentioned disc-like object having a concave portion or a convex portion comprises

a step of relatively moving a detection means against the fore-mentioned disc-like object, making three loci of the fore-mentioned detection means cross against the peripheral rim of the fore-mentioned disc-like object and determining the position of 3 pairs of intersections consisting of one pair of 2 points in the fore-mentioned reference co-ordinate system, a step of selecting a common perpendicular bisector among 3 perpendicular bisectors with respect to the intersections of the fore-mentioned 3 pairs, and a step of calculating the radius of the fore-mentioned disc-like object and the center position from the specific point on the fore-mentioned common perpendicular bisector and 2 pairs of intersections with respect to the common perpendicular bisector (see Figure 7; column 9, line 50 to column 10, line 65 esp. column 10, lines 43-58)**.**

Claim 14

Sundar et al. teaches **An automatic positioning method of a disc-like object according to claim 13, wherein the locus of the fore-mentioned detection means is a circular arc** (see column 9, lines 17-18)**.**

Claims 15 and 16 recite *devices* substantially performing the methods of claims 13 and 14, and are similarly rejected for reasons given above for the respective claim and claim elements, and further that Sundar et al. teaches a "device" for the performing (see at least Figure 2b).

Claim 17

Sundar et al. teaches **an automatic carrying device of a disc-like object with an unknown radius having one concave portion or one convex portion at one portion of peripheral rim, equipped with the automatic positioning device of a disc-like object according to claim 15** (as above under claim 15)**,**

a correction means of correcting a carrying route preliminarily taught of a holding portion of a carrying device based on a transition quantity which was calculated by the fore-mentioned positioning method, and a means of carrying the fore-mentioned disc-like object to a fixed carrying position with the fore-mentioned holding portion along the fore-mentioned carrying route corrected, by controlling the operation of the fore-mentioned holding portion of the fore-mentioned carrying device (see column 10, line 66 to column 11, line 18: describing

using of the methods to "correctly center" the substrate the "substrate aligner" prior to further processing).

Claim 18

Sundar et al. teaches **a method for automatically teaching a reference position which is the reference of the position of a disc-like object in the reference co-ordinate system including the position of a handling device of the fore-mentioned disc-like object, comprising**

a step of placing the disc-like object with an unknown radius at a fixed place which is the reference position (see column 11, lines 1-18)**,**

a step of determining the center position of the fore-mentioned disc-like object in the fore-mentioned reference co-ordinate system and

a step of memorizing the position of the fore-mentioned fixed place in the fore-mentioned reference co-ordinate system which was determined by calculation based on the fore-mentioned center position in the fore-mentioned handling device as the reference position (see column 4, lines 55-67)**,**

wherein the step of determining the center position of the fore-mentioned disc-like object comprises

a step of detecting at least 3 points on the peripheral rim of the disc-like object by the relative movement of one one-point detecting type detection means against the fore-mentioned disc-like object, and a step of determining the center position using at least 3 points of the fore-

mentioned co-ordinate positions detected and the formula of a circumference (see Figure 7; column 10, lines 49-65: see "best fit circle" i.e. a "using a formula of a circumference")**.**

Claim 22

Sundar et al. teaches **a method for automatically positioning the fore-mentioned disc-like object with an unknown radius in the reference co-ordinate system including the position of a handling device of the disc-like object, comprising**

a step of determining the center position of the fore-mentioned disc-like object in the fore-mentioned reference co-ordinate system (Figure 7; column 10, lines 1-38: finding the center of a "notched" wafer substrate) **and**

a step of calculating a transition quantity from the center position preliminarily taught to the fore-mentioned center position determined in the fore-mentioned reference co-ordinate system (Figure 7; column 9, lines 65-68: calculating a substrate center offset…, a "transition quantity" from the center position)**,**

wherein the step of determining the center position of the fore-mentioned disc-like object comprises

a step of detecting at least 3 points on the peripheral rim of the disc-like object by the relative movement of one one-point detecting type detection means against the fore-mentioned disc-like object, and

a step of determining the center position using at least 3 points of the fore-mentioned co-ordinate positions detected and the formula of a circumference (see Figure 7; column 10, lines 49-65: see "best fit circle" i.e. a "using a formula of a circumference")**.**

Claims 27 and 31 recite *devices* substantially performing the methods of claims 18 and 22, and are similarly rejected for reasons given above for the respective claim elements, and further that Sundar et al. teaches a "device" for the performing (see at least Figure 2b).

Claims 19 and 23

Sundar et al. teaches **an automatic teaching/positioning method of a disc-like object according to claims 18 and 22, wherein in place of a step of detecting at least 3 points on the peripheral rim of the disc-like object by the fore-mentioned one one-point detecting type detection means, the fore-mentioned at least 3 points on the peripheral rim of the fore-mentioned disc-like object are detected by 3 or more of one-point detecting type detection means, and the fore-mentioned 3 or more of detection means comprise a step of detecting at least 3 points by respectively crossing once relatively against the peripheral rim of the fore-mentioned disc-like object** (Figure 1B (48); column 4, lines 11-35)**.**

Claims 28 and 32 recite *devices* substantially performing the methods of claims 19 and 23, and are similarly rejected for reasons given above for the respective claim elements, and further that Sundar et al. teaches a "device" for the performing (see at least Figure 2b).

Claims 21 and 25

Sundar et al. teaches **an automatic teaching/positioning method of a disc-like object according to claims 18 and 22,** however Sundar does not *expressly* teach **wherein the fore-mentioned disc-like object is one with an unknown radius having one concave portion or one convex portion at one portion of peripheral rim, at least 3 points detected on the peripheral rim of the fore-mentioned disc-like object are 4 points or more, when all of the radii or center positions which were determined from the formula of a circumference coincide with respect to all of combinations which 3 points among the fore-mentioned 4 points or more constitute, the value is selected and when they do not coincide, the detection of the fore-mentioned 4 points or more are repeated until they coincide** (see embodiment described by column 10, lines 1-39 and lines 58-65, whereby formulas for calculating the center position "reduce the effect of irregularities" (e.g. the concave "notch") by calculating a "center and radius for every possible combination of three data points" from the six data points available in Figure 7).

Claims 30 and 34 recite *devices* substantially performing the methods of claims 21 and 25, and are similarly rejected for reasons given above for the respective claim elements, and further that Sundar et al. teaches a "device" for the performing (see at least Figure 2b).

Claim 26

Sundar et al. teaches **an automatic carrying method of a disc-like object using the automatic positioning method of the disc-like object according to claim 22, comprising**

a step of correcting a carrying route preliminarily taught of a holding portion of a carrying device as the fore-mentioned handling device based on a transition quantity which was calculated by the fore-mentioned positioning method, and a step of carrying the fore-mentioned disc-like object to a fixed carrying position with the fore-mentioned holding portion of the fore-mentioned carrying device along the fore-mentioned carrying route corrected (see column 10, line 66 to column 11, line 18: describing using of the methods to "correctly center" the substrate the "substrate aligner" prior to further processing).

Claim 35 recites a *device* substantially performing the method of claim 26, and is similarly rejected for reasons given above for the respective claim elements, and further that Sundar et al. teaches a "device" for the performing (see at least Figure 2b).

Claims 37, 40, and 41

Sundar et al. teaches **an automatic semiconductor manufacturing equipment equipped with the automatic reference position teaching device of a disc-like object according to claims 15, 27, and 31** (see Abstract; esp. column 12)**.**

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. Claims 1-12, 36, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sundar et al. (US Pat. No. 6,198,976) in view of Shimazaki et al. (US Pat. No. 5,917,601).

Claim 1

Sundar et al. teaches **a method for automatically teaching a reference position which is the reference of the position of a disc-like object in the reference co-ordinate system including the position of a handling device to the handling device of the fore-mentioned disc-like object** (see Abstract)**, comprising**

a step of determining the center position of a disc-like object … which was situated at a fixed place being the reference position in the fore-mentioned reference co-ordinate system (Figure 7 (222, 225); at least one locus) **and**

a step of memorizing the position of the fore-mentioned fixed place in the fore-mentioned reference co-ordinate system which was determined by calculation based on the fore-mentioned center position in the fore-mentioned handling device as the reference position (see column 4, lines 55-67)**,**

wherein the step of determining the center position of the fore-mentioned disc-like object comprises

a step of relatively moving a detection means against the fore-mentioned disc-like object and making one locus of the fore-mentioned detection means cross against the circumference of the fore-mentioned disc-like object (Figure 4; column 5, lines 15-27, generally describing the passing of one locus of the disc-like "relatively moving" broadly, the disc (wafer substrate) moving relative to the sensor or vice versa))**,**

a step of determining the position of two intersections by the fore-mentioned crossing in the fore-mentioned reference co-ordinate system (Figure 7 (222, 225); the two intersections of the at least one locus)**, and**

a step of calculating the fore-mentioned center position using the specific point on the perpendicular bisector of the section of a line combining the fore-mentioned two intersections, the fore-mentioned two intersections and the radius of the fore-mentioned disc-like object (Figure 5 (222, 225) with (236) a perpendicular bisector of the chord 222-225 described by the locus)**.**

However, whereas Figure 7 as above may be interpreted as *visually* teaching the step of calculating the center position using the bisector and radius, and Sundar et al. discloses a formula (column 10, line 25) for finding the center position (Xc, Yc) from intersections X and Y, and a known radius, and further that as chords may be used to find centers using perpendicular bisectors (column 10, lines 43-57), Sundar et al. does not *expressly* teach calculating the center position with the formula using **a known radius.**

Shimazaki et al. expressly teaches "easily" using the "length and central position of a chord of the wafer" and obtaining the center position by "using the relationship between the lengths of three sides of a right triangle" when the radius of the wafer is known beforehand." (column 3, lines 4-29). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to apply the known technique of finding the center position as in Shimazaki as this would have been the easiest method for calculation given a known radius of the wafer.

Claim 2

Sundar et al. teaches or suggests **an automatic reference position teaching method of a disc-like object according to claim 1, wherein the locus of the fore-mentioned detection means is a circular arc** (see column 9, lines 17-18)**.**

Claim 3 recites substantially the method of claim 1 (as above), including **a method for automatically positioning a disc-like object with a known radius in the**

reference co-ordinate system including the position of a handling device of the fore-mentioned disc-like object, a step of determining the center position of the fore-mentioned disc-like object in the fore-mentioned reference co-ordinate system (Figure 7; column 10, lines 1-38: finding the center of a "notched" wafer substrate)**, and** (particularly to claim 3) **a step of calculating a transition quantity from the center position preliminarily taught to the fore-mentioned center position determined in the fore-mentioned reference co-ordinate system** (Figure 7; column 9, lines 65-68: calculating a substrate center offset…, a "transition quantity" from the center position).

Claim 4

Sundar et al. teaches **a method for automatically positioning a disc-like object with a known radius having one concave portion or one convex portion at one portion of peripheral rim in the reference co-ordinate system including the position of a handling device of the disc-like object** (see Abstract; and column 3, lines 4-28, esp. line 15 describing a "notch" in the substrate perimeter, known in the art to be a "concave" portion used for alignments and handling)**, comprising**

a step of determining the center position of the fore-mentioned disc-like object having a concave portion or a convex portion in the fore-mentioned reference co-ordinate system (Figure 7; column 10, lines 1-38: finding the center of a "notched" wafer substrate) **and**

a step of calculating a transition quantity from the center position preliminarily taught to the fore-mentioned center position determined in the fore-mentioned reference co-ordinate system (Figure 7; column 9, lines 65-68: calculating a substrate center offset…, a "transition quantity" from the center position)**,**

wherein the step of determining the center position of the fore-mentioned disc-like object having a concave portion or a convex portion comprises

a step of relatively moving a detection means against the fore-mentioned disc-like object and making two loci of the fore-mentioned detection means cross against the peripheral rim of the fore-mentioned disc-like object (see Figure 7; column 10, lines 39-58)**,**

a step of determining the position of two pairs of intersections consisting of two points of each of the pairs by crossing of the fore-mentioned two loci with the peripheral rim of the fore-mentioned disc-like object in the fore-mentioned reference co-ordinate system (see Figure 7; column 10, lines 39-58)**,**

a step of calculating the center position of a circle when those intersections are situated on a circumference including the fore-mentioned peripheral rim excluding the fore-mentioned concave portion or convex portion using the specific point on the perpendicular bisector of the section of a line combining the fore-mentioned two intersections, the fore-mentioned two intersections and the radius of the fore-mentioned disc-like

object, with respect to the fore-mentioned two pairs (see Figure 7; column 10, lines 39-58)**, and**

a step of selecting the center position of the fore-mentioned disc-like object based on the positional deviation direction of the central point when the fore-mentioned intersections are situated at the fore-mentioned concave portion or convex portion comparing the fore-mentioned two center positions calculated (see Figure 7; column 10, lines 39-58; esp. column 10, lines 1-38, the proceeding embodiment addressing the "notch" portion of a wafer substrate)**.**

Claim 5

Sundar et al. teaches or suggests **an automatic positioning method of a disc-like object according to claim 3, wherein the locus of the fore-mentioned detection means is a circular arc** (see column 9, lines 17-18)**.**

Claim 6

Sundar et al. teaches or suggests **an automatic carrying method of a disc-like object, comprising**

a step of carrying out the automatic positioning method of the disc-like object according to claim 3 (as above under claim 3)**, a step of correcting a carrying route preliminarily taught of a holding portion of a carrying device as the fore-mentioned handling device based on a transition quantity which was**

calculated by the fore-mentioned positioning method, and a step of carrying the fore-mentioned disc-like object to a fixed carrying position with the fore-mentioned holding portion of the fore-mentioned carrying device along the fore-mentioned carrying route corrected (see column 10, line 66 to column 11, line 18: describing using of the methods to "correctly center" the substrate the "substrate aligner" prior to further processing)**.**

Claims 7-12 recite *devices* substantially performing the methods of claims 1-6, and are similarly rejected for reasons given above for the respective claim and claim elements, and further that Sundar et al. teaches a "device" for the performing (see at least Figure 2b).

Claims 36, 38, and 39

Sundar et al. teaches or suggests **an automatic semiconductor manufacturing equipment equipped with the automatic reference position teaching device of a disc-like object according to claims 7, 9, and 10** (see Abstract; esp. column 12)**.**

18. Claims 20, 24, 29, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sundar et al. (US Pat. No. 6,198,976) as applied to claims 18 and 22 above.

Claims 20 and 24

Sundar et al. teaches **an automatic teaching/positioning method of a disc-like object according to claims 18 and 22,** however, Sundar does not *expressly* teach **wherein the fore-mentioned step of detecting at least 3 points comprises a step of crossing with the peripheral rim of the fore-mentioned disc-like object by relatively drawing an O-character type, V-character type, U-character type, L-character type or C-character type locus against the fore-mentioned disc-like object.**

Sundar et al. teaches moving the substrate "in any path, or trajectory…linear, circular, or irregular" including "zigzags" (column 9, lines 15-20) and at least one embodiment that may be "just one sensor" (column 10, lines 58-65). From Figure 7, Sundar teaches advantage to "crossing the peripheral rim of the disc-like object" (the water substrate) to obtain multiple points of intersection at the peripheral rim of the wafer. That Sundar et al. teaches as advantageous the crossing of multiple locus (Figure 7), and that the substrate may pass a single sensor "in any path, or trajectory… including zigzags", it would have been obvious to one of ordinary skill in the art at the time of the invention that drawing a circular path (a full circle, e.g. an "O"), or a "V" shaped path (such as suggested by Figure 7, where two loci sharing a common center point), would cause the detection means to cross the wafer peripheral rim at multiple

locations, thereby providing the multiple points of reference for the calculation of the center position of the wafer. One of ordinary skill in the art would have recognize that although perhaps incidental to the operation of Sundar et al., the drawing of circular paths, or "V" shapes, or zigzags, would in whole or in part resemble "character-like" shapes traced against the surface of the wafer.

Claims 29 and 33 recite *devices* substantially performing the methods of claims 20 and 24, and are similarly rejected for reasons given above for the respective claim elements, and further that Sundar et al. teaches a "device" for the performing (see at least Figure 2b).

Conclusion

19. The prior art made of record and listed on the attached PTO Form 892 but not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dave Robertson whose telephone number is (571)272-8220. The examiner can normally be reached on 9 am to 5 pm, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Dave Robertson/
Examiner, Art Unit 2121